

Leon County's Sustainable RAIN WATER CISTERNS Demonstration – at the Leon County Extension Center



Rainwater Harvesting & Cistern Storage
integrated with
Micro-jet Irrigation Loop Trunk System

“Florida Friendly” Demonstration Landscape Gardens & Vegetable Garden



UF UNIVERSITY of
FLORIDA
IFAS Extension

WL Sheftall, Extension Agent IV, University of Florida Extension – Leon County



“Florida Friendly” Demonstration Gardens

MAINTAINED BY LEON COUNTY MASTER GARDENERS FOR EDUCATION

The Leon County Extension Center’s demonstration landscape and vegetable gardens allow 24/7 public educational inspection of roughly 2000 plant accessions. Plants are arranged in aesthetic groupings according to adaptation to sun, shade, drought, and saturation. Horticultural practices employed here demonstrate “Florida Friendly” landscaping principles. At every season of the year, there are ~ 575 different varieties of ornamental trees, shrubs, vines, perennial herbs and annuals growing in the gardens – plus vegetables, honey bee hives, and wildlife nest boxes for bluebirds, purple martins, owls and bats.

switching the irrigation source to rainwater

A major sustainability upgrade to the Leon County Extension Center’s landscape gardens has been the installation of four cisterns that together can store up to 40,000 gallons of rainwater, and allow a sizeable reduction in potable water use.

Even though all demonstration garden beds are well-mulched using recycled yard waste, they are not self-sustaining on rainwater from the sky. Irrigation is required to meet the cumulative plant water demand of approximately 650,000 gallons annually. 40,000 gallons of stored rainwater was the amount calculated to satisfy about 80% of annual irrigation needs – a cost-effective percentage. Projected savings on the water bill at current 2012 rates would total \$1800-\$2400 per year. Manual measurements of tank water levels, and of irrigation system use, are being kept to interpret water bills over the ensuing years.

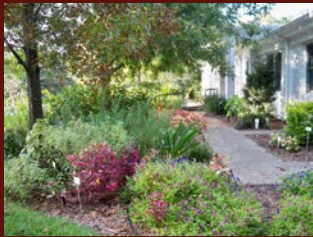
REPURPOSED: FIBERGLASS UNDERGROUND GASOLINE STORAGE TANKS CONVERTED TO BURIED CISTERN STORAGE OF HARVESTED RAIN WATER

Four salvaged 10,000 gallon single-wall fiberglass tanks originally built and used for underground gasoline storage have been re-purposed to storing rainwater underground. They were cleaned and installed in pairs, and they operate as pairs. Existing downspouts around the building were plumbed into a system of ~800 linear feet of PVC piping. The system was engineered to convey aggregated volumes at 1 cubic feet per second (CFS) in the heaviest rainstorm, so that roof drainage is not impaired.

Gravity fills the tanks, but electricity is required to distribute the stored rainwater. A 1.5 horsepower (hp) vertical pump fitted to each pair of tanks lifts the water, and an air bladder at each pair pressurizes it to 35-85 psi (compared to City water which comes in at 100-125 psi). 35 psi is the minimum pressure required to operate micro-jet irrigation.

GARDENING ANEW WITH RAIN WATER: AWASH IN SOLUTIONS!

At the Leon County Sustainable Demonstration Building, use of expensive, treated potable water with a high energy/carbon footprint is replaced by rainwater diverted from the stormwater load to the twin benefits of soil-watering and groundwater recharge.



- Managing an urban site’s rainfall to reduce stormwater runoff as much as possible avoids pollution in our streams and lakes while providing water for irrigation.
- Reducing our well withdrawals from the finite Floridan aquifer is a necessary step to protecting the underground water budget of the Wakulla Springshed that underlies Tallahassee – and future springflow.
- Furthermore, there are community cost savings: Tallahassee’s stormwater has a huge environmental footprint, and maintaining City drainage infrastructure to prevent flooding comes at a high cost to taxpayers.

WHAT ABOUT INSIDE WATER USE?

Toilets in the four restrooms are scheduled for replacement with high-efficiency toilets (HETs) which save 20% more water than the current industry standard of 1.6 gallons-per-flush (gpf) models. They should be dual-flush toilets, which meet HET criteria of 1.28 gallons or less "effective flush volume" per flush.

[This performance is achieved by averaging one high flush from 0.8 - 1.1 gallons with two low flushes from 1.3 - 1.6 gallons per flush.]

WHAT HAPPENS IF THE TANKS EMPTY?

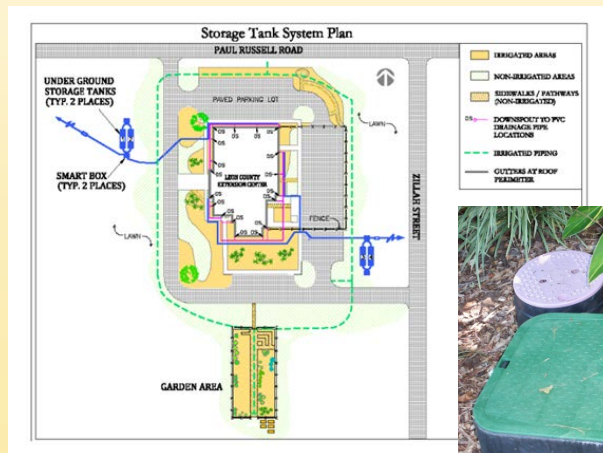
The tanks are linked by an inter-connect valve to a commercial irrigation water meter. This valve allows the Extension Center's irrigation system to run on City water and pressure when irrigation needs cannot be met by rainwater stored in the tanks. An electrical system designed by Leon County Facilities staff operates this valve, when float switches at both pairs of tanks indicate "empty." The irrigation meter is separate from the building's conventional water meter. No sewer charges are billed, since 100% of the metered water is used for outdoor irrigation.



FILTRATION AND IRRIGATION OUTPUT THROUGH LOOP PIPE SYSTEM

The rainwater being harvested is filtered first by gutter screens, and then by a series of debris filters before going into the tanks. As water is pumped from each pair of tanks, it goes first through a hydrodynamic separator that removes grit up to 70-80 microns, then progressive polishing filters. These filtration steps are necessary to prevent the garden's micro-jet irrigation system sprayheads from becoming clogged and non-functional.

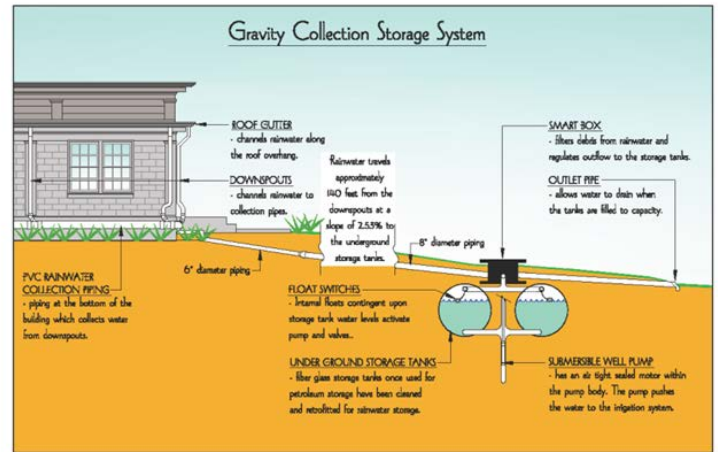
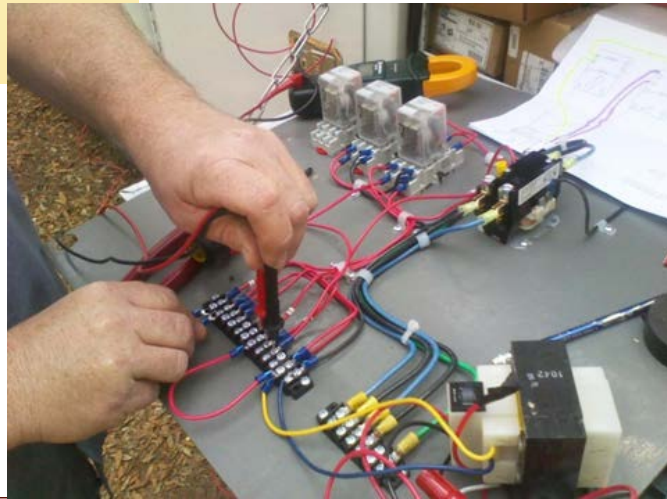
The irrigation output system is operated through one programmable controller with a rain shut-off device. A loop irrigation trunk line of ~1000' in total length distributes water from the cisterns. Ten valve boxes positioned throughout the garden supply water out to one or two irrigation zones per valve box. When valve box zones are turned on automatically by the controller, water is pumped out through flexible irrigation tubing that lies on top of the mulch beds and conveys water to the step-down micro-jet sprayheads.



WASTE REDUCTION THROUGH GARDEN RECYCLING

Outdoors at the Extension Center, plastic nursery pots are reused by Master Gardeners. Garden trimmings are brush-piled and eventually break down into mulch. Additional mulch is stockpiled on-site by utility line arborists working in the vicinity. Mulched planting beds are renewed regularly, as needed, by Master Gardeners at monthly garden work days.

Vegetable and fruit peelings, non-meat food waste, coffee grinds and other kitchen compostables from indoor foods and nutrition programs are added to the horticultural brush piles, to cycle nitrogen harvested from the soil back into the soil by way of compost. No waste biomass leaves the site – it is all recycled back into the soil. This practice renews soil water-holding capacity, soil tilth and fertility.



Leon County Sustainable Building Demonstration

LEON COUNTY EXTENSION

University of Florida/IFAS Extension
615 Paul Russell Road
Tallahassee, Florida 32301

For more information, contact:
Will Sheftall, Extension Agent IV – Natural Resources
Office: 850-606-5200



Mobile: 229-224-8470
sheftallw@leoncountyfl.gov